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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,912	10/22/2003	Akira Izumi	P/1250-264	6373

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1180 AVENUE OF THE AMERICAS
NEW YORK, NY 100368403

EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1792

MAIL DATE	DELIVERY MODE
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01/30/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/690,912

Applicant(s)

IZUMI ET AL

Examiner

Kin-Chan Chen

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2007.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7, 10 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7, 10 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 7, 10, and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 7, **"only in the supplying of the alkaline solution in said first step and said third step** are droplets or solution supplied to the surface by injection **from said external-mix bi-fluid nozzle"** is new matter, which is not supported by the specification. "only" excludes other process steps, therefore, it is considered an ***exclusionary provision***.

Any negative limitation or exclusionary provision must have basis in the original disclosure. Any claim containing a negative limitation or exclusionary provision which does not have basis in the original disclosure should be rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. Ex parte Parks, 30 USPQ2d 1234, 1236 (Bd. Pat. App. & Inter. 1993). The mere absence of a positive recitation is not basis for an exclusion. Specification must clearly set forth an explicit definition. Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d985, 989 (Fed.Cir. 1999).

2. Claims 7, 10, and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "said external-mix bi-fluid nozzle" in line 6 from bottom. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7, 10, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (US 5,635,053) in view of Hirae (US 20030178047) or Izumi et al. (US 20030170988) as evidenced by Verhaverbeke (US 5,972,123), Tomita et al. (US 6,431,185) and Skee (US 6,465,403).

In a method for cleaning the substrate, Aoki (col.1 lines 36 to 47) teaches a first step of applying alkaline solution (e.g., a mixed solution containing an ammonia water and hydrogen peroxide water), and a second step of applying an acid solution (e.g., mixed solution containing hydrochloric acid and hydrofluoric acid) to efficiently clean the surface of a substrate. Aoki also teaches using the cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (col.1, line 42, see also the example starting from col. 1, line 46). Aoki also clearly describes the function of each cleaning solution (specifically, col. 2, lines 28-45). Hence, it would have been obvious to one with ordinary skill in the art to apply cleaning solutions (alkaline solutions and acid solutions) in

multiple steps **in any combinations** (or repeating the process) as required for a particular product in order to achieve the required cleanness.

Unlike the claimed invention, Aoki does not disclose rotate the substrate in a horizontal plane during the process and apply injection of droplets formed by mixing the solution with gas. In a method and system for substrate processing, Hirae ([0038][0061]) or Izumi ([0026][0089]) teaches that the substrate may be rotated in a horizontal plane during the process the droplets formed by mixing a solution and gas may be injected from a nozzle (so-called injection and collision) such as external-mix bi-fluid nozzle to a surface of a substrate. The quality of cleaning process is improved, and no liquid unnecessary drops from the forward end of the nozzle are formed. Hence, it would have been obvious to one with ordinary skill in the art to apply injection of droplets formed by mixing the solution with gas as disclosed by Hirae or Izumi in any steps of process of Aoki because Hirae or Izumi teaches that to do so improves the quality of the cleaning process. The combined prior art is silent about that the etching effect may take place when applying the acid solution in the second step. However, when same acid solution is applied on the same surface of the substrate, it would be expected that the method of the combined prior art would contain the same properties and functions as claimed (such as etching effect on the surface of the substrate).

The above-cited claims differ from the prior art by specifying various process parameters (temperature and pH value) for the alkaline and acid solutions. However, same are known to be result-effective variables and commonly determined by routine experiments the process of conducting routine

experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using ordinary temperature and adjusting concentration of alkaline solution for desired pH value) to obtain optimal result with a reasonable expectation of success. See the case laws cited below. Also see Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45), Tomita et al. (US 6,431,185; col. 22, lines 40-50) and Skee (US 6,465,403; Table 17A-17E) as evidence. Verhaverbeke discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning, which clearly shows that temperature is a recognized result-effective variable in the art of wet cleaning. Tomita and Skee show the pH value is a recognized result-effective variable in the art of wet cleaning.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). In re Woodruff, 16USPQ2d 1934,1936 (Fed. Cir.1990); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809; In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

CRITICALITY OF PROCESSING PARAMETERS

"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" Ex parte Khusid, 174 USPQ 59.

The combined prior art is silent about that the etching effect may take place when applying the acid solution in the second step. However, when same acid solution is applied on the same surface of the substrate, it would be

expected that the method of the combined prior art would contain the same properties and functions as claimed (such as etching effect on the surface of the substrate).

Response to Arguments

5. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45) discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning. Tomita et al. (US 6,431,185; col. 22, lines 40-50) teaches the theory and principles in pH dependency on the cleaning of the semiconductor substrate. Skee (US 6,465,403; Table 17A-17E) shows the effect of the pH and composition /concentration on the cleaning of the semiconductor substrate.

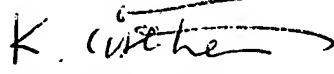
7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.**

See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on

access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Kin-Chan Chen
Primary Examiner
Art Unit 1792

January 28, 2008